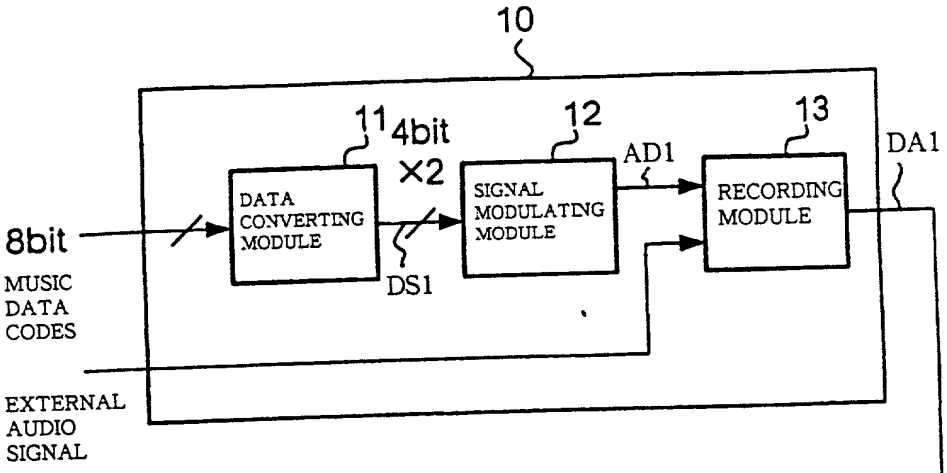
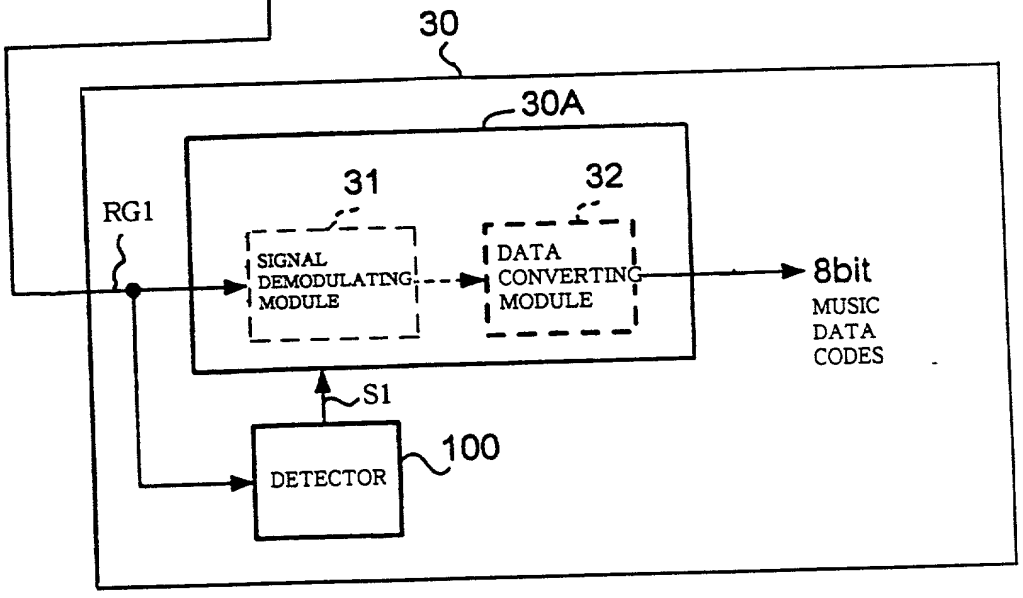

10
11
4bit
×2
12
13
AD1
DA1
DATA CONVERTING MODULE
SIGNAL MODULATING MODULE
RECORDING MODULE
8bit
MUSIC DATA CODES
DS1
EXTERNAL AUDIO SIGNAL


20

Fig. 1


30
30A
31
32
RG1
SIGNAL DEMODULATING MODULE
DATA CONVERTING MODULE
8bit
MUSIC DATA CODES
S1
DETECTOR
100

ITEM	DESIGN	UNIT	NOTE
Recording channel for modulated signal	R	Channel	Audio signal is recorded in L-channel.
Bit rate	12.6	kbps (kilobits/sec.)	
Carrier frequency	6.30	KHz	
Symbol Velocity	3.15	K baud (kilo symbols /sec.)	
Bits of Symbol	4	bits/symbol	
Coding	4 – bit gray code		
Modulation	16 DPSK		
Demodulation	Synchronous detection		
Synchronization	Synchronous nibble		
Delay time of audio signal in recording	0	msec	
Delay time of audio signal in playback	500	msec	
Recording Level	– 6.0 to – 12.0	dB	Relative value with respect to full range.
Silent period	2.0 ≦	second	Necessary for symchronization.

Fig. 2

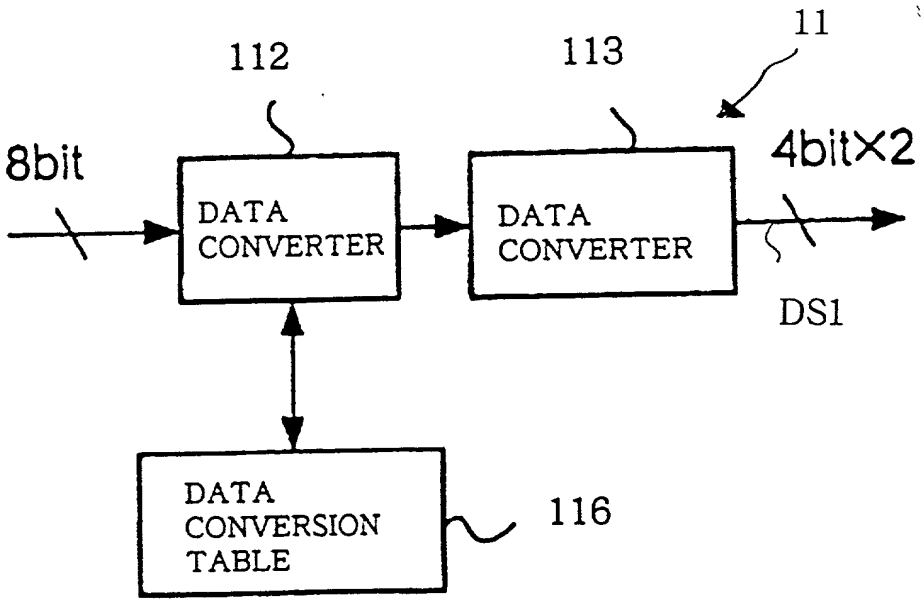

11
112
113
8bit
4bit×2
DATA CONVERTER
DATA CONVERTER
DS1
DATA CONVERSION TABLE
116

Fig. 3

BIT STRING OF STATUS BYTE BEFORE DATA CONVERSION	BIT STRING AFTER DATA CONVERSION	DEFINITION OF STATUS BYTE
C0	C40	PROGRAM CHANGE AT CHANNEL 0
C1	C41	PROGRAM CHANGE AT CHANNEL 1
C2	C42	PROGRAM CHANGE AT CHANNEL 2
⋮	⋮	⋮
CF	C4F	PROGRAM CHANGE AT CHANNEL F
F0	C0	EXCLUSIVE
F1	C1	TIME CODE QUARTER FRAME
F2	C2	SONG POSITION POINTER
F3	C3	SONG SELECT
F4	C54	(NOT DEFINED)
F5	C55	(NOT DEFINED)
F6	C6	TUNE REQUEST
F7	C7	END OF EXCLUSIVE
F8	C8	TIMING CLOCK
F9	C9	(NOT DEFINED)
FA	CA	START
FB	CB	CONTINUE
FC	CC	STOP
FD	CD	(NOT DEFINED)
FE	CE	ACTIVE SENSING
FF	CF	SYSTEM REQUEST

Fig. 4

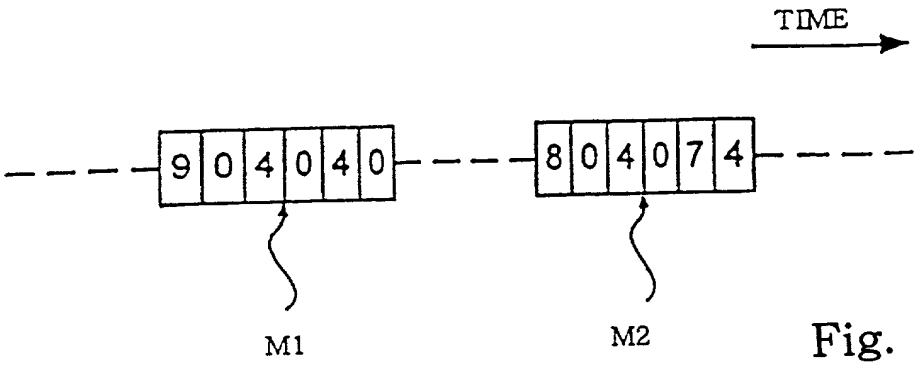


Fig. 5

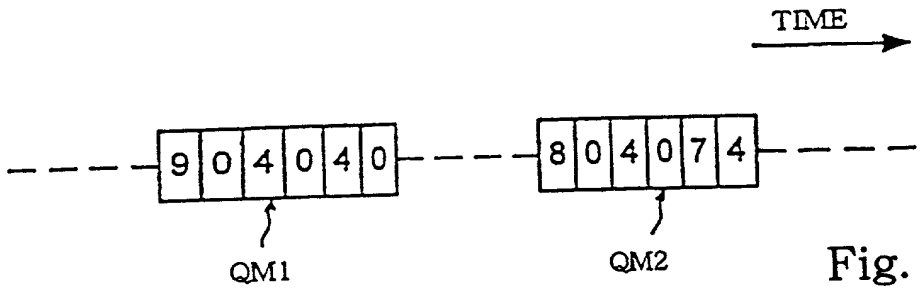


Fig. 6

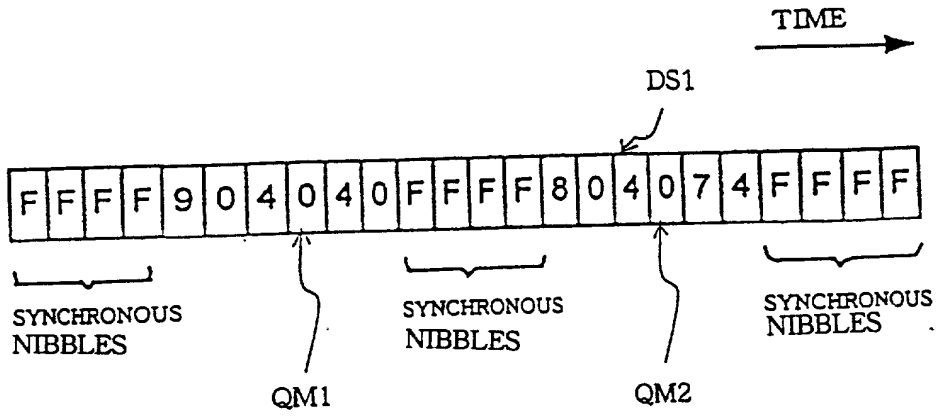


Fig. 7

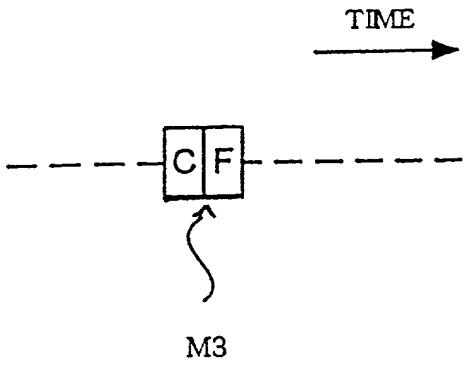


Fig. 8

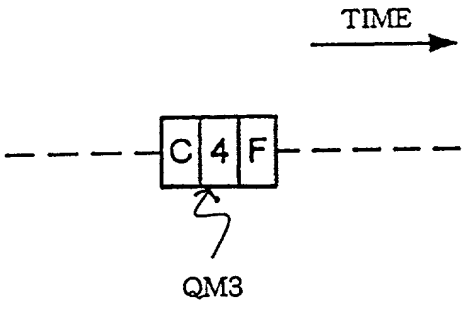


Fig. 9

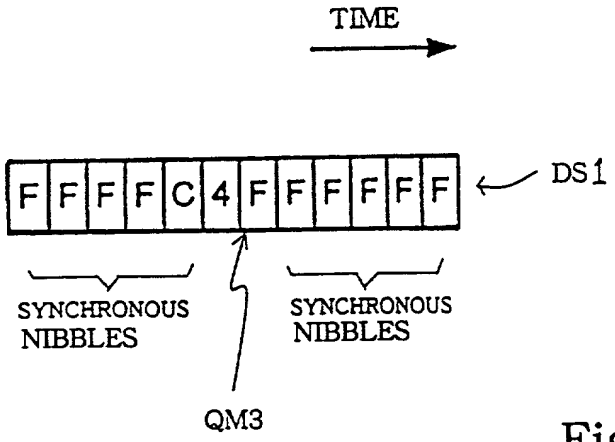


Fig. 10

Gray Code Data	POSITION [Dec]	PHASE [rad]	I – COMPONENT	Q – COMPONENT
1000	0	0	1	0
1010	1	0.392699	0.92388	0.382683
1110	2	0.785398	0.707107	0.707107
0110	3	1.178097	0.382683	0.92388
0010	4	1.570796	0	1
0011	5	1.963495	-0.38268	0.92388
0111	6	2.356194	-0.70711	0.707107
1111	7	2.748894	-0.92388	0.382683
1011	8	3.141593	-1	0
1001	9	3.534292	-0.92388	-0.38268
1101	10	3.926991	-0.70711	-0.70711
0101	11	4.31969	-0.38268	-0.92388
0001	12	4.712389	0	-1
0000	13	5.105088	0.382683	-0.92388
0100	14	5.497787	0.707107	-0.70711
1100	15	5.890486	0.92388	-0.38268

Fig. 11

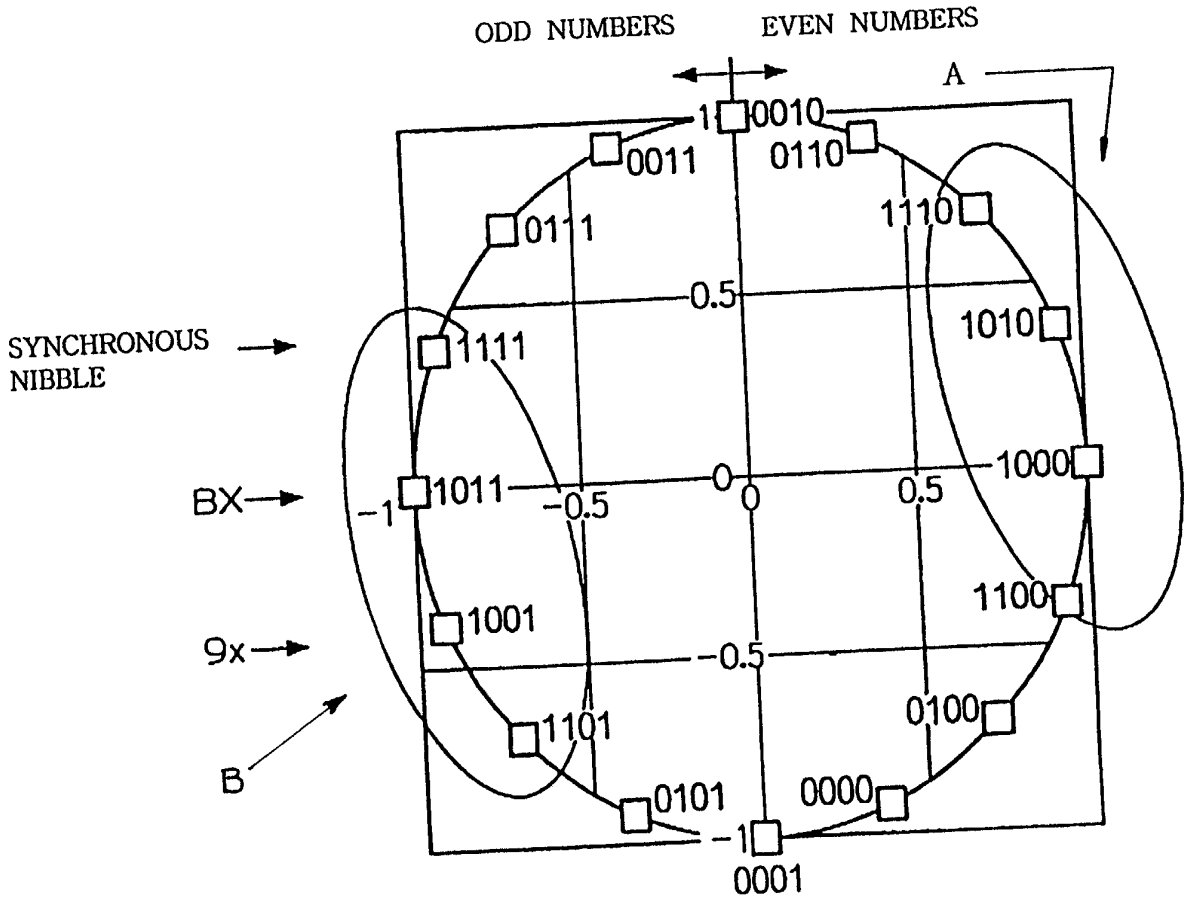


Fig. 12

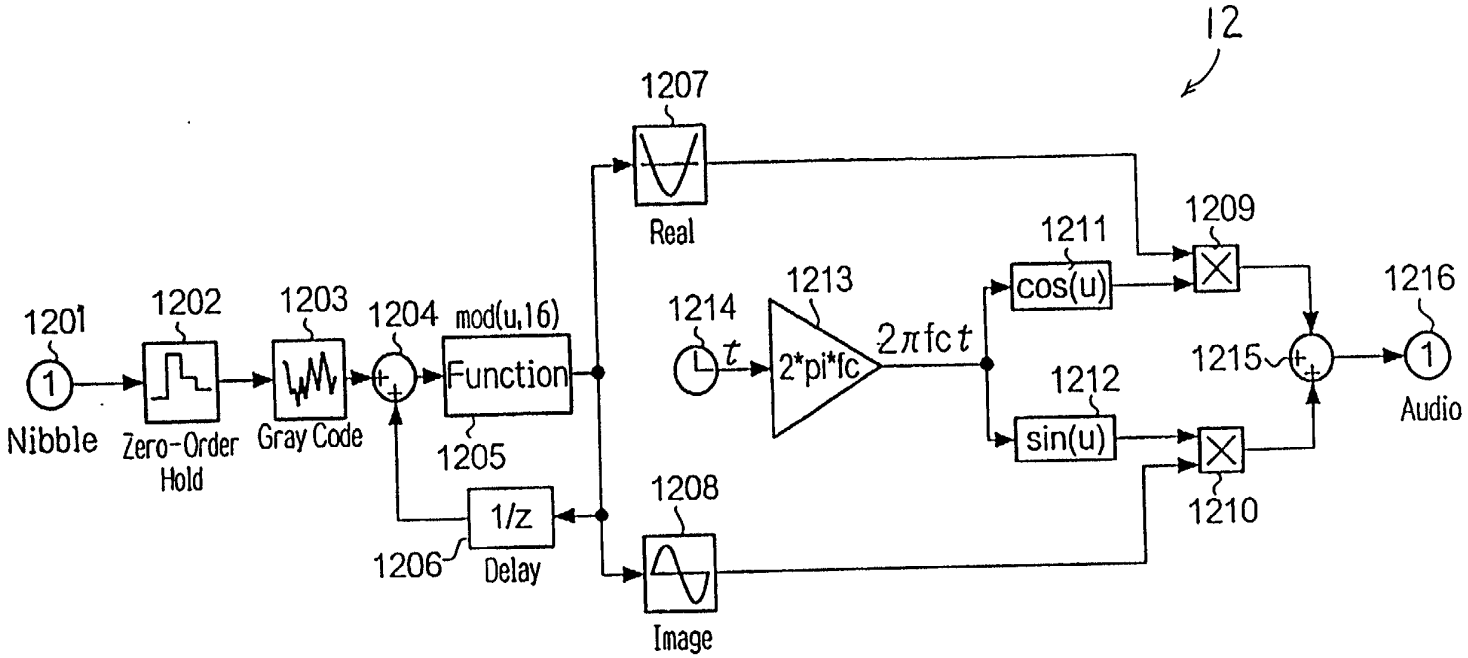

12
1207
Real
1209
1211
cos(u)
1213
1214
t
2*pi*fc
2πfct
1216
1201
1202
1203
1204
mod(u,16)
Function
1215
1212
sin(u)
Audio
Nibble
Zero-Order Hold
Gray Code
1205
1/z
1208
1206
Delay
1210
Image

Fig. 13

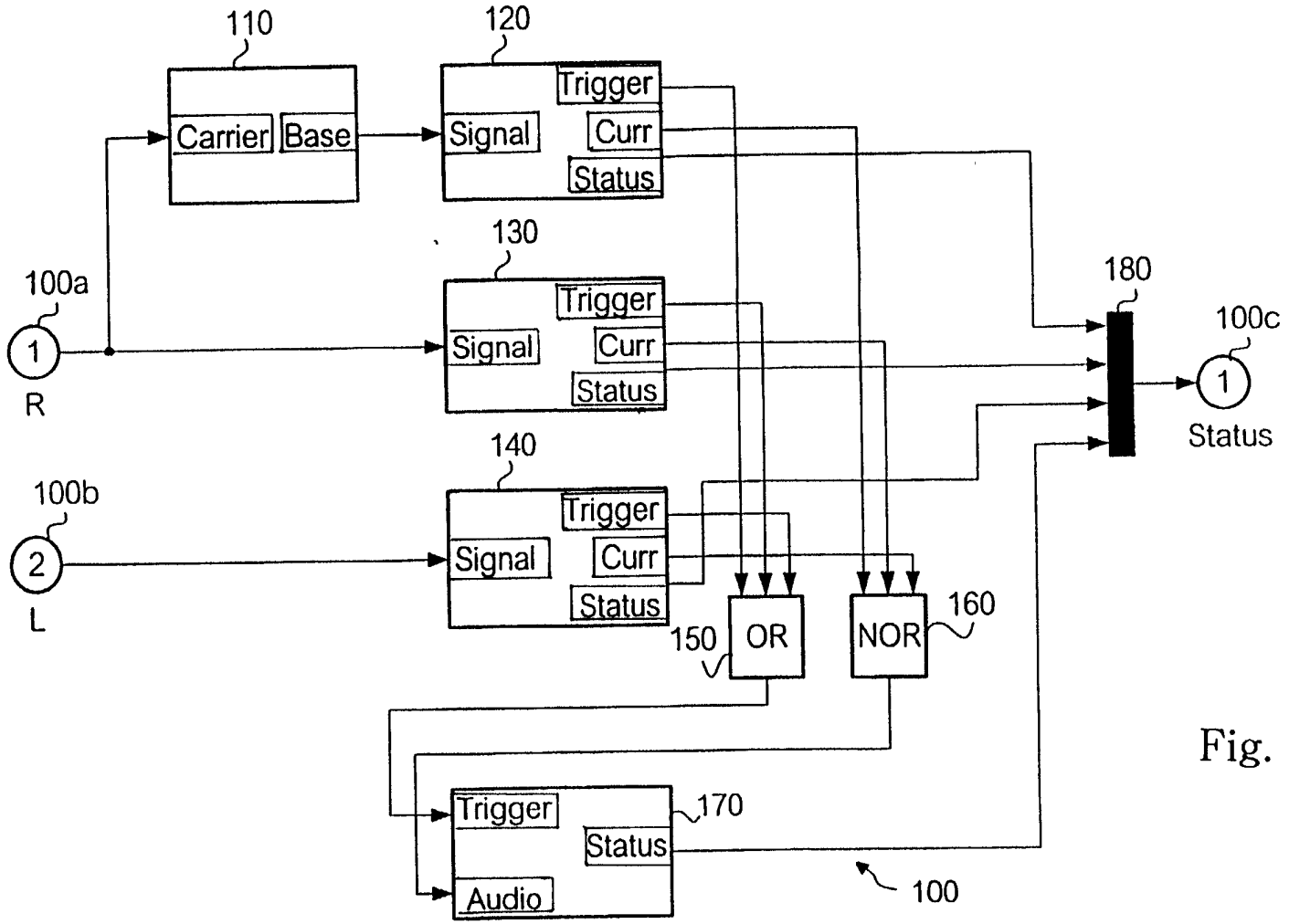


Fig. 14

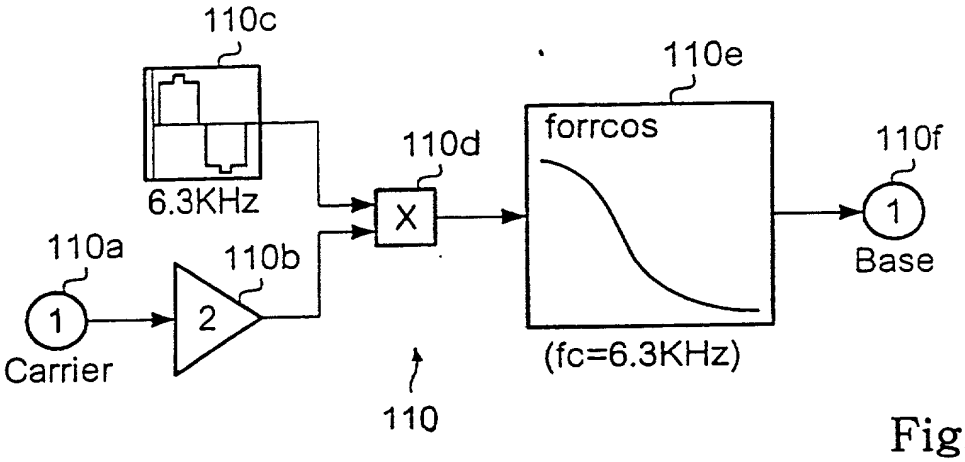

110c
6.3KHz
110e
forrcos
110d
X
110f
1
Base
110a
1
Carrier
110b
2
(fc=6.3KHz)
110

Fig. 15

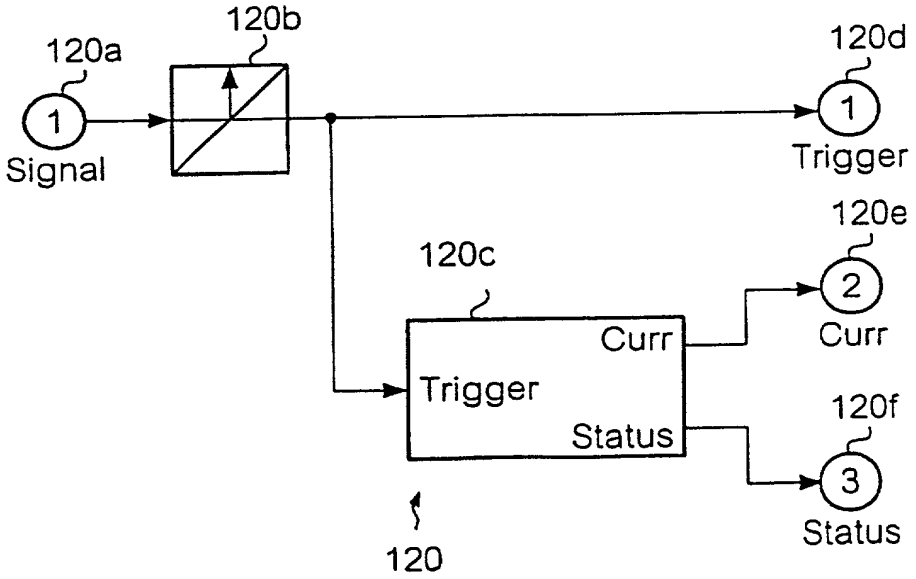

120b
120a
1
Signal
120d
1
Trigger
120e
120c
2
Curr
Curr
Trigger
Status
120f
3
Status
120

Fig. 16

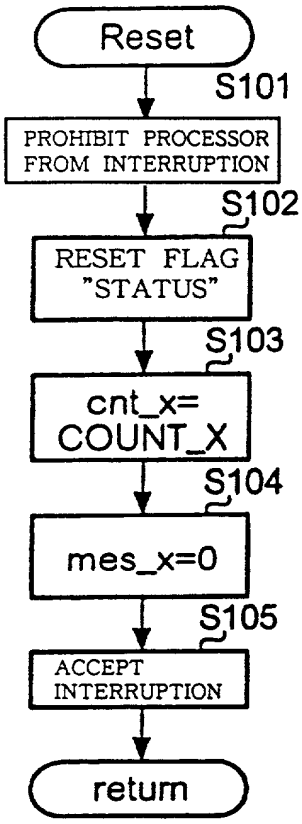


Fig. 17A

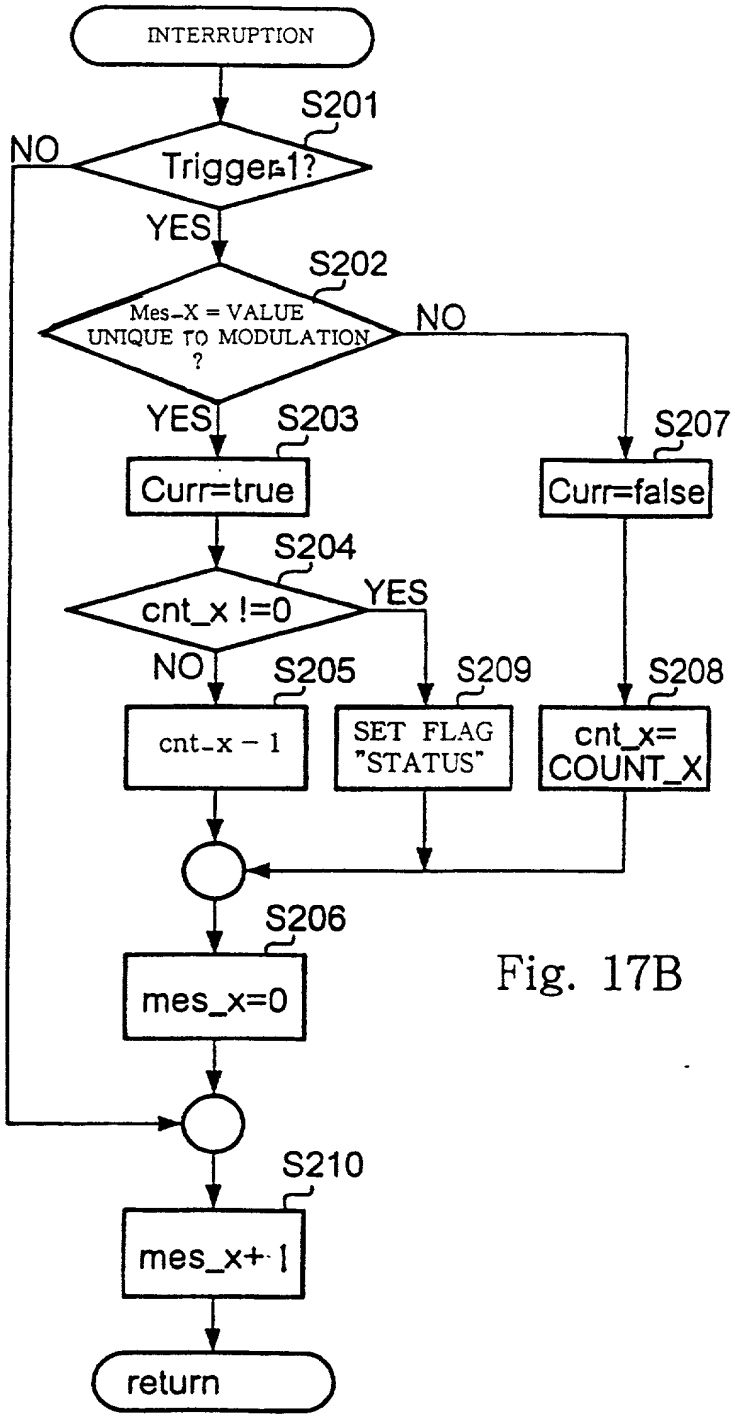


Fig. 17B

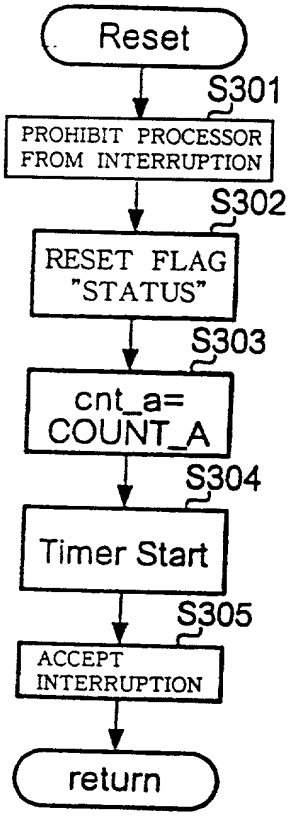


Fig. 18A

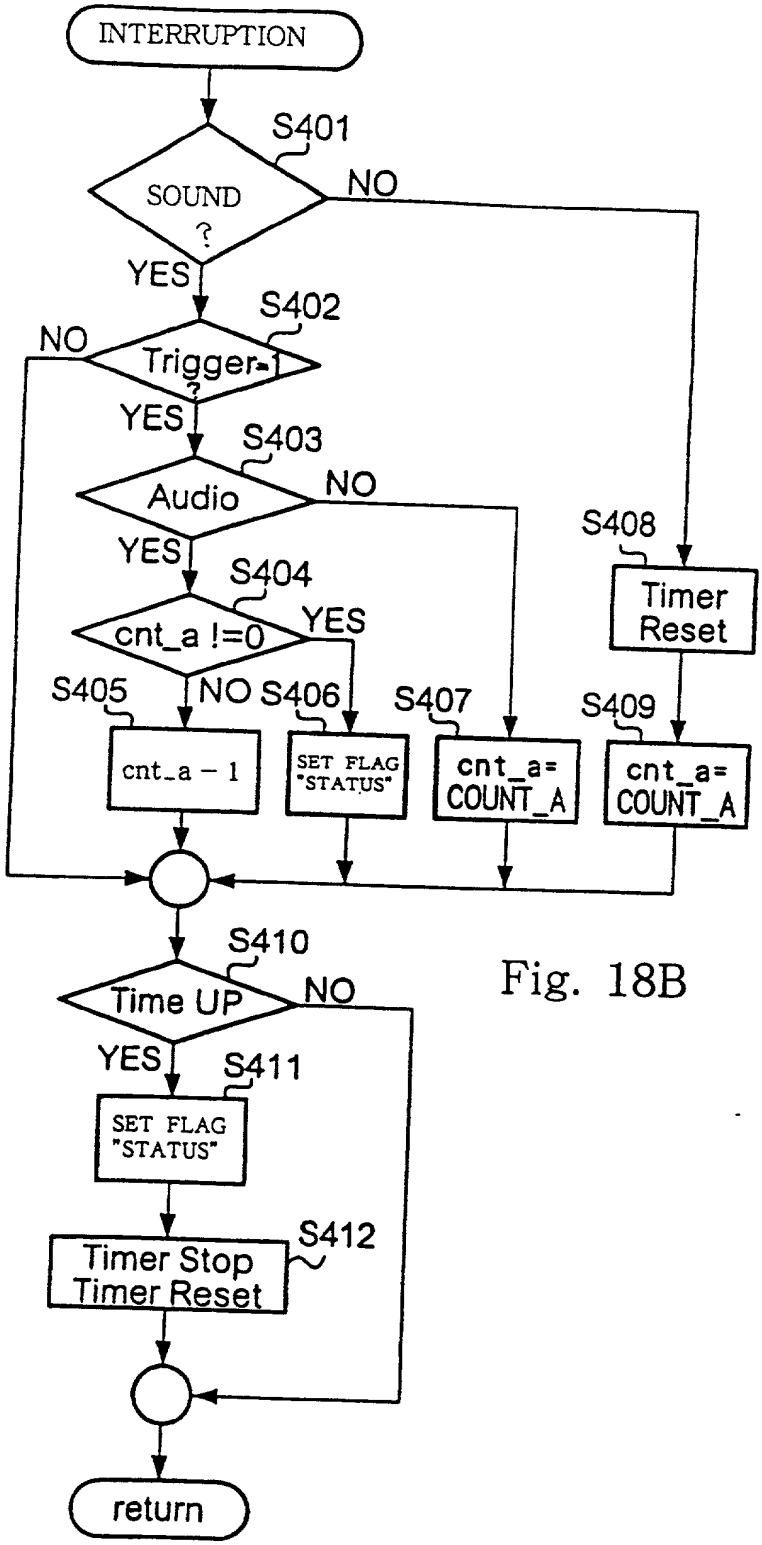


Fig. 18B

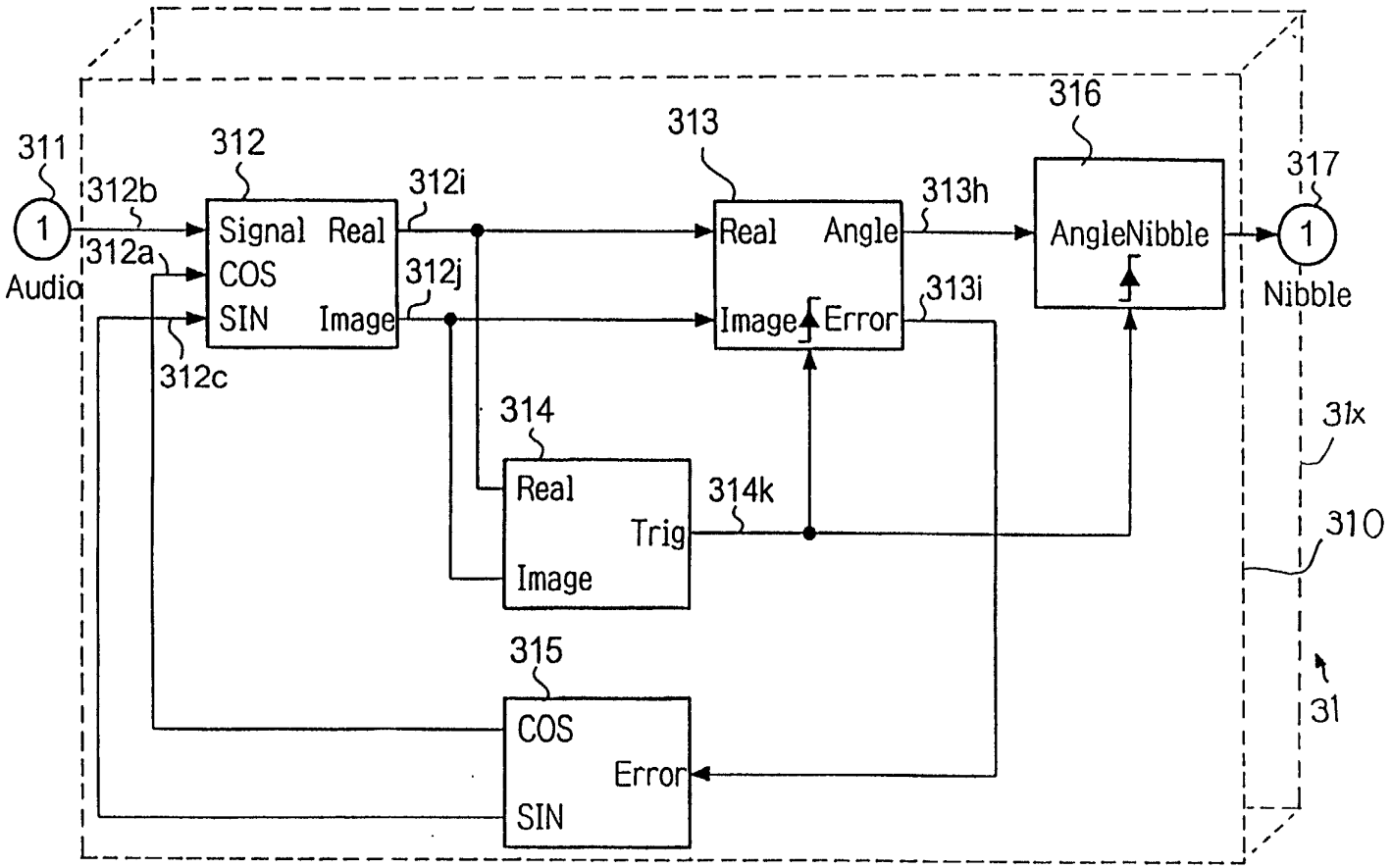

311
1
Audio
312
312b
312a
312c
Signal
COS
SIN
Real
Image
312i
312j
313
Real
Image
Angle
Error
313h
313i
316
AngleNibble
317
1
Nibble
314
Real
Trig
Image
314k
315
COS
SIN
Error
31x
310
31

Fig. 19

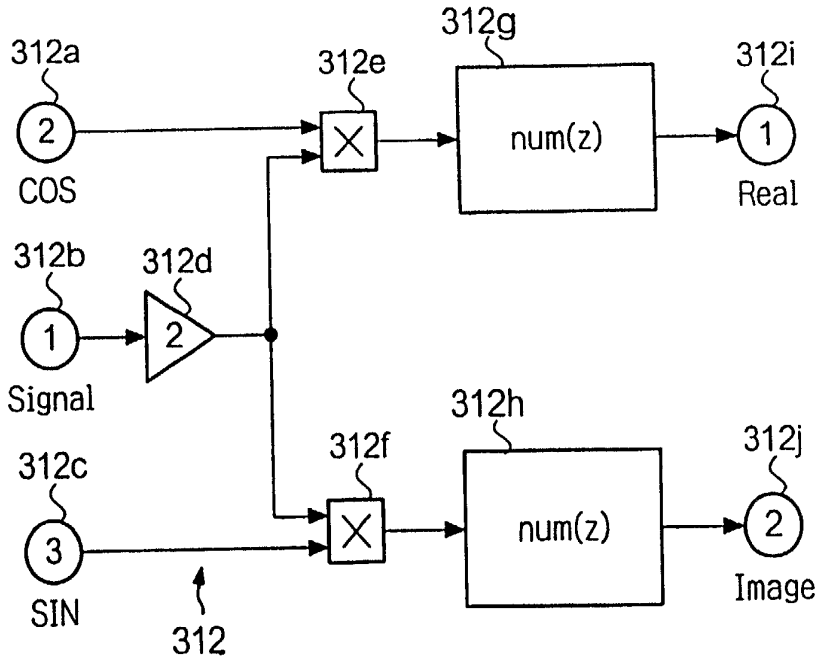


Fig. 20

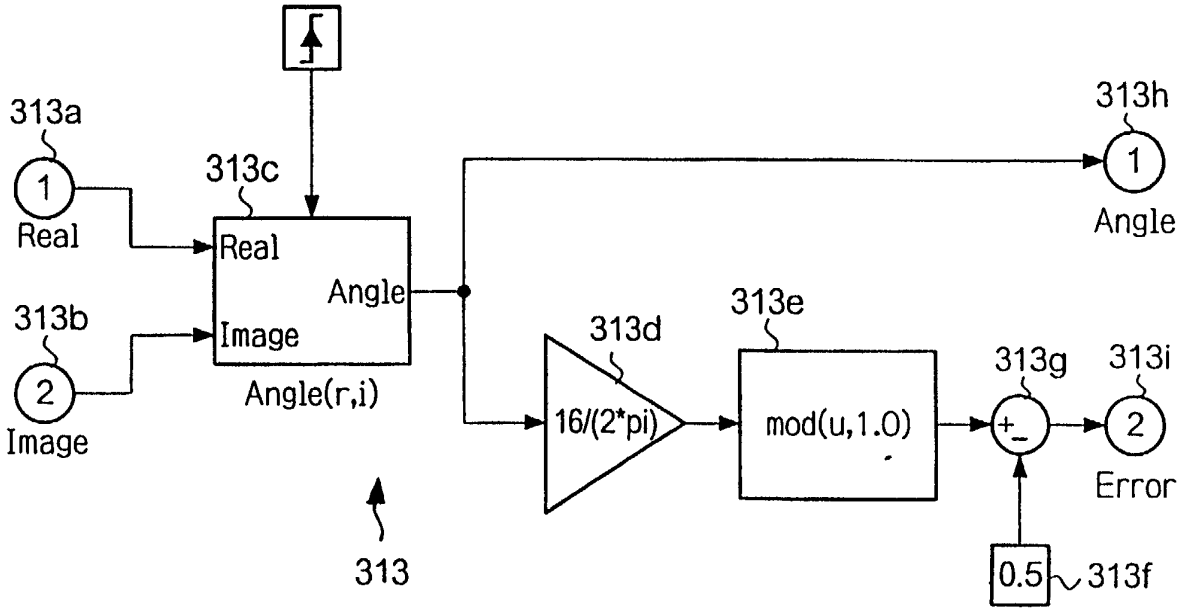

313a
1
Real
313b
2
Image
313c
Real
Image
Angle
Angle(r,i)
313
313h
1
Angle
313d
16/(2*pi)
313e
mod(u,1.0)
313g
+
-
313i
2
Error
0.5
313f

Fig. 21

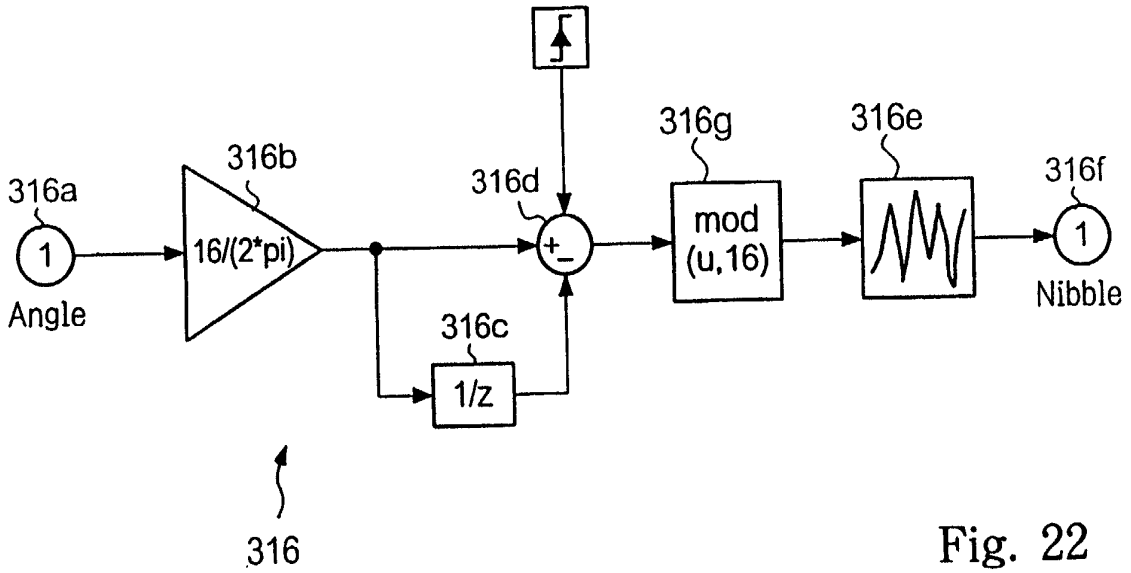


Fig. 22

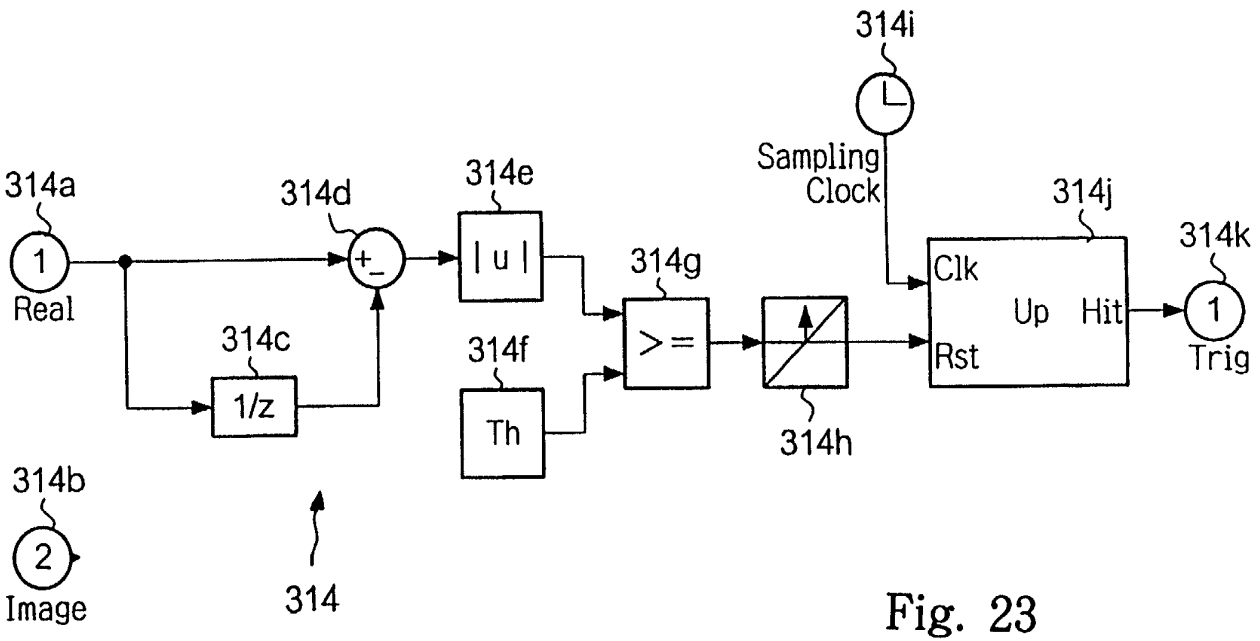

314i
Sampling Clock
314a
1
Real
314d
+_
314e
| u |
314g
>=
314j
Clk
Up
Hit
Rst
314k
1
Trig
314c
1/z
314f
Th
314h
314b
2
Image
314

Fig. 23

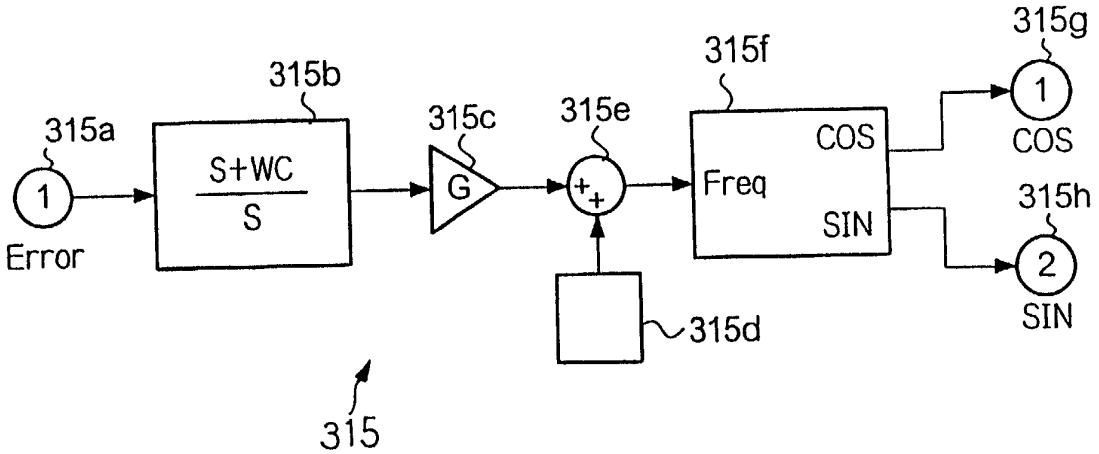

315g
315f
315b
315a
315c
315e
S+WC
S
G
Freq
COS
SIN
1
Error
1
COS
315h
2
SIN
315d
315

Fig. 24

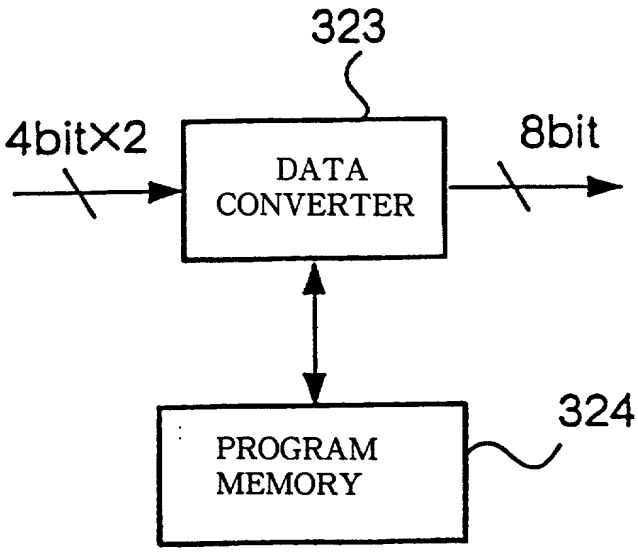


Fig. 25

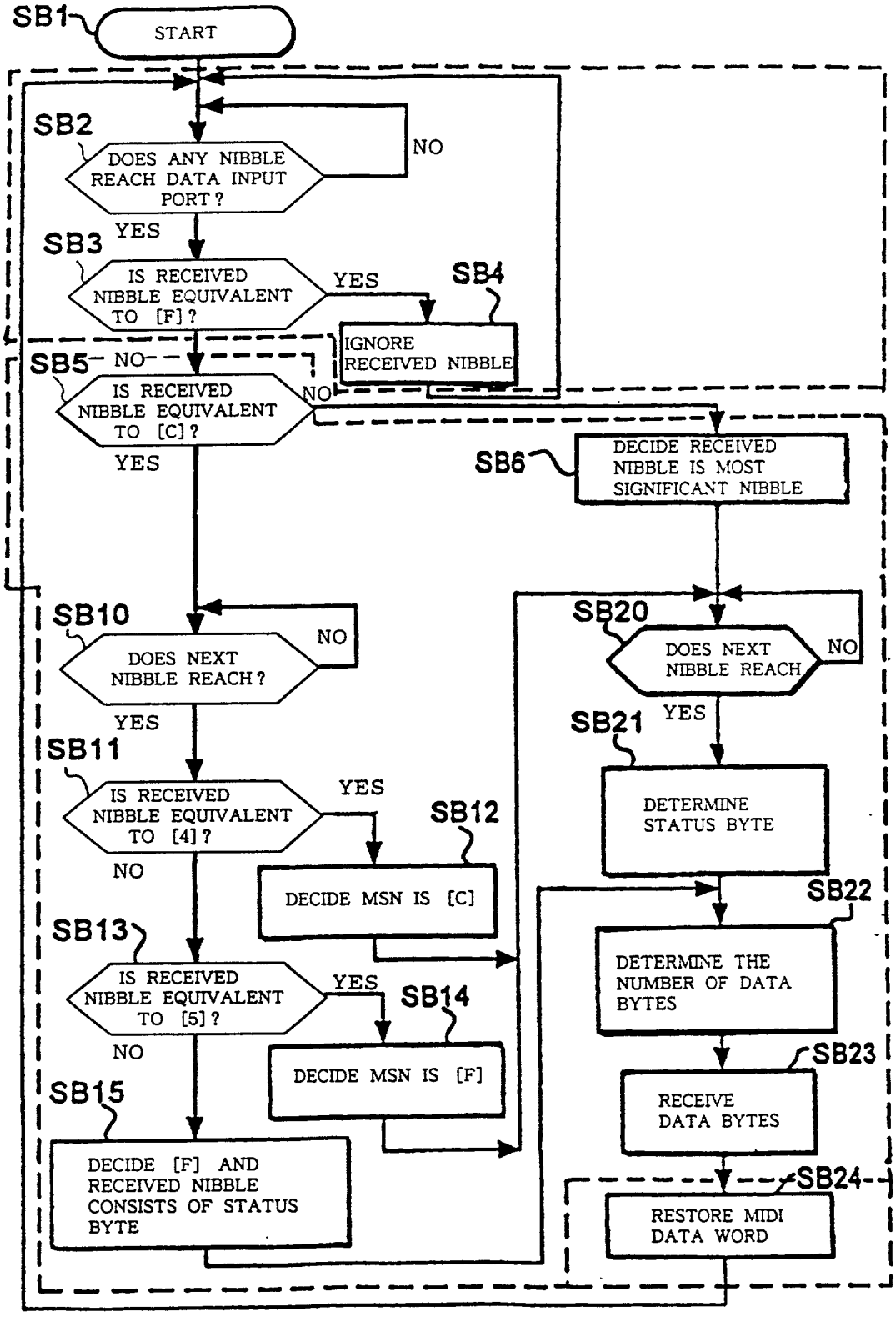

SB1
START
SB2
DOES ANY NIBBLE REACH DATA INPUT PORT?
NO
YES
SB3
IS RECEIVED NIBBLE EQUIVALENT TO [F]?
YES
SB4
IGNORE RECEIVED NIBBLE
SB5
NO
IS RECEIVED NIBBLE EQUIVALENT TO [C]?
NO
YES
SB6
DECIDE RECEIVED NIBBLE IS MOST SIGNIFICANT NIBBLE
SB10
DOES NEXT NIBBLE REACH?
NO
YES
SB11
IS RECEIVED NIBBLE EQUIVALENT TO [4]?
YES
SB12
DECIDE MSN IS [C]
NO
SB13
IS RECEIVED NIBBLE EQUIVALENT TO [5]?
YES
SB14
DECIDE MSN IS [F]
NO
SB15
DECIDE [F] AND RECEIVED NIBBLE CONSISTS OF STATUS BYTE
SB20
DOES NEXT NIBBLE REACH
NO
YES
SB21
DETERMINE STATUS BYTE
SB22
DETERMINE THE NUMBER OF DATA BYTES
SB23
RECEIVE DATA BYTES
SB24
RESTORE MIDI DATA WORD

Fig. 26

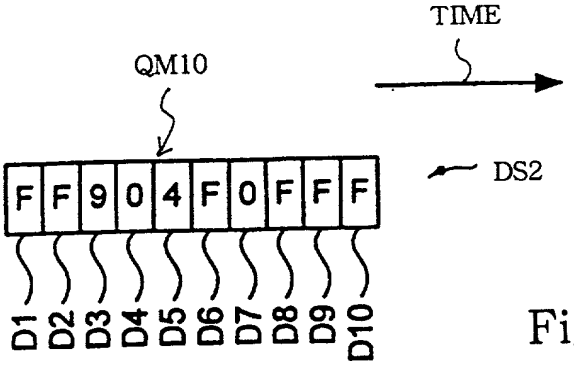


Fig. 27A

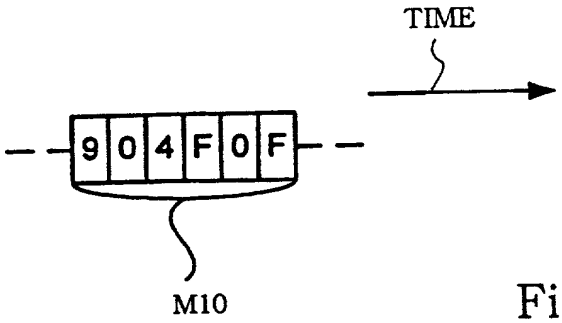


Fig. 27B

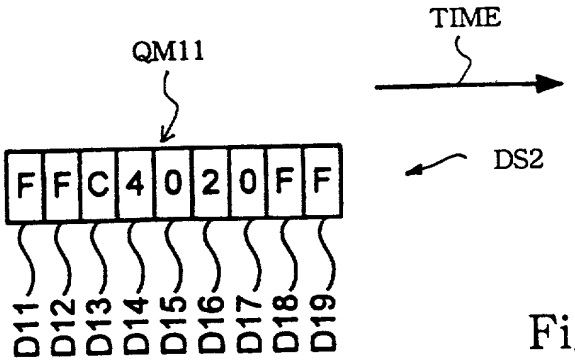


Fig. 28A

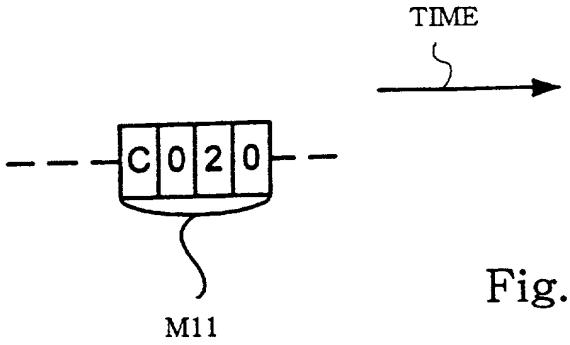


Fig. 28B

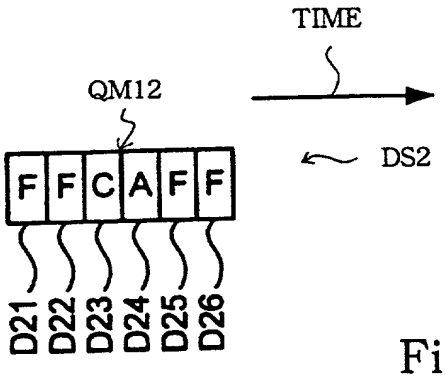


Fig. 29A

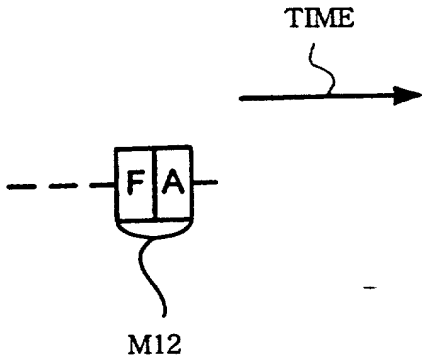


Fig. 29B

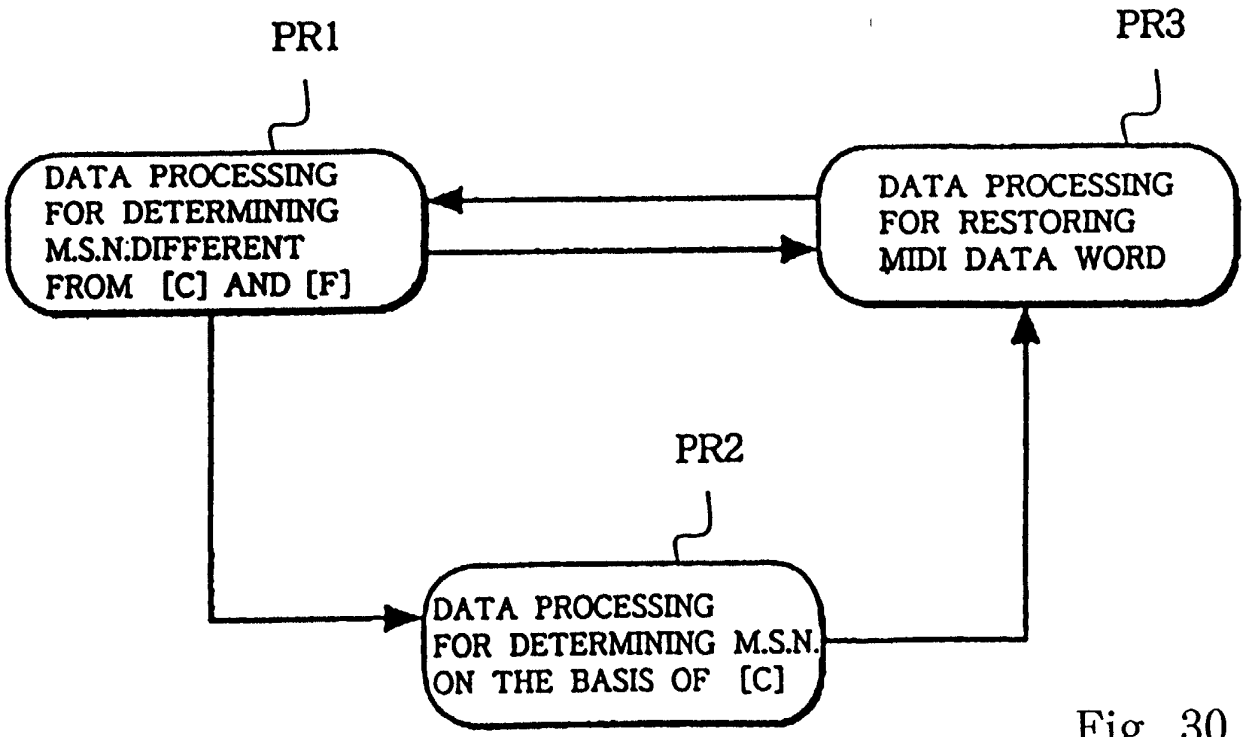


Fig. 30

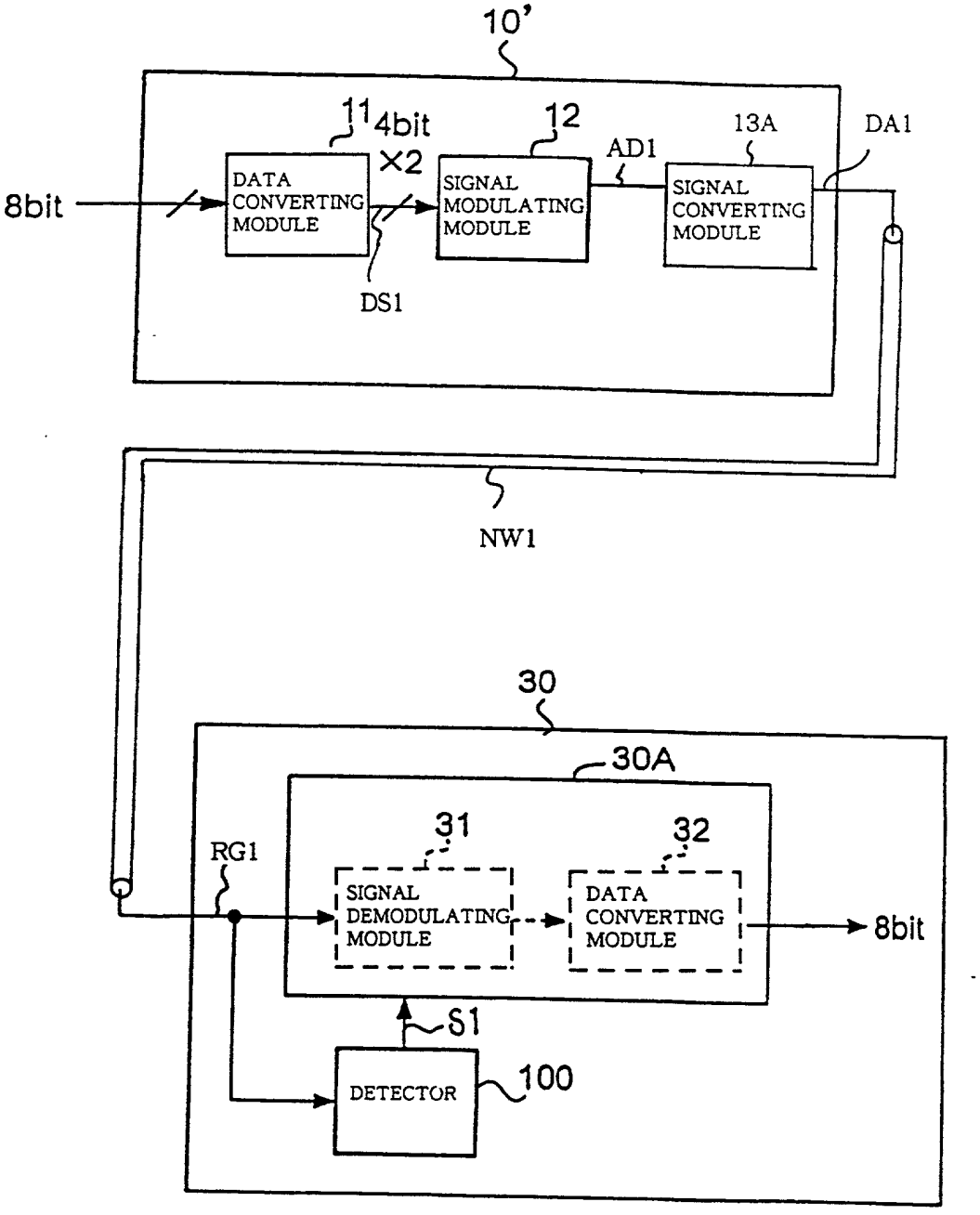

10'
11
4bit
×2
12
AD1
13A
DA1
8bit
DATA CONVERTING MODULE
SIGNAL MODULATING MODULE
SIGNAL CONVERTING MODULE
DS1
NW1
30
30A
31
32
RG1
SIGNAL DEMODULATING MODULE
DATA CONVERTING MODULE
8bit
S1
DETECTOR
100

Fig. 31

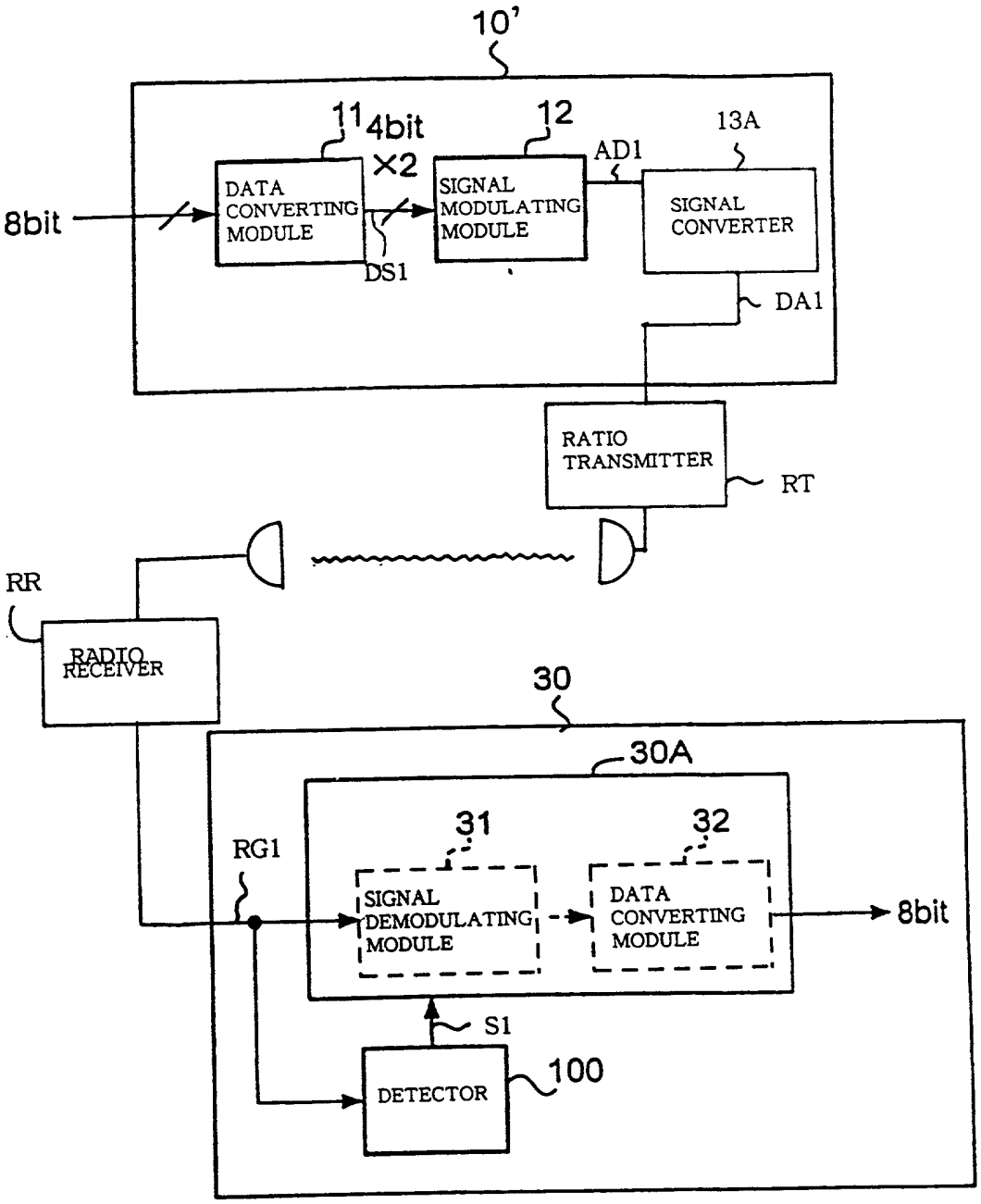

10'
11
4bit
×2
12
13A
AD1
8bit
DATA CONVERTING MODULE
SIGNAL MODULATING MODULE
SIGNAL CONVERTER
DS1
DA1
RATIO TRANSMITTER
RT
RR
RADIO RECEIVER
30
30A
31
32
RG1
SIGNAL DEMODULATING MODULE
DATA CONVERTING MODULE
8bit
S1
DETECTOR
100

Fig. 32